LETTER WORK PLAN
2018 ON-PROPERTY VOC AND 1,4-DIOXANE
GROUNDWATER INVESTIGATION
FACILITY WIDE
NWIRP BETHPAGE, NEW YORK

Introduction

The Navy is conducting an investigation to evaluate the potential release of volatile organic compounds (VOCs) and 1,4-dioxane at the facility using the existing groundwater monitoring well network at the former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage in Nassau County, New York (Figures 1 and 2). The existing groundwater network is currently used to evaluate the release and cleanup of select VOCs, polychlorinated biphenyls (PCBs), and/or metals in groundwater resulting from operations at former NWIRP Bethpage. This letter work plan was prepared by Tetra Tech, Inc. (Tetra Tech) under the Naval Facilities Engineering Command (NAVFAC) Atlantic Comprehensive Long-Term Environmental Action Navy (CLEAN) under Contract Number N62470-16-D-9008 Task Order WE13.

NWIRP Bethpage was a Government-Owned, Contractor-Operated facility that was operated by Northrop Grumman until 1996. As a result of Northrop Grumman's decision to terminate operations at NWIRP Bethpage, the U.S. Congress passed special legislation via Public Law (PL 105-85 Sec 2852 FY-1998) that was issued as a part of the National Defense Authorization Act of 1998, authorizing conveyance of the Navy's real property at NWIRP Bethpage to Nassau County, New York for economic redevelopment.

Plant 3 was the main manufacturing plant at NWIRP Bethpage beginning in the 1940s. Production lines at Plant 3 were used for a variety of aircraft metal treatment and finishing procedures, including chemical surface preparation, electroplating, chemical milling, alodine treatment, and process inspection. Solvents used in these operations included trichloroethene (TCE), 1,1,1-trichloroethane (TCA), and tetrachloroethene. These chemicals were also used at other facilities in the area.

Select VOCs have been identified in groundwater at the former NWIRP Bethpage facility related to the use of chlorinated and non-chlorinated solvents at the facility. These VOCs are identified under the Operable Unit (OU) 1 and OU2 Record of Decisions (RODs) (Navy, 1995 and Navy, 2003), and the Public Water Supply Contingency Plan (PWSCP) (Arcadis, 2003). However, several other VOCs have been identified in off-property areas that may or may not result from former NWIRP operations (e.g., toluene and Freon 113). In addition, 1,4-dioxane has been detected in off property groundwater, including VOC-impacted groundwater associated with the former NWIRP Bethpage. 1,4-Dioxane is most notably known for its industrial use as a stabilizer in TCA. However, it is also widely used in a variety of other residential and commercial products (including dish soaps, cosmetics, shampoos, and deodorants). As a result, the 1,4-dioxane in groundwater may not be associated with industrial activities at the facility.

This current investigation targets potential new VOCs and 1,4-dioxane in groundwater at the facility. The objectives of this study are as follows:

1. Are there additional VOCs in groundwater at the facility that should be addressed by a response action?

2. Is there environmental evidence that the 1,4-dioxane identified in off-property groundwater originated at the former NWIRP Bethpage?

To address the objectives, this investigation includes groundwater sample collection from the existing monitoring well network at the former NWIRP Bethpage and surface water sample collection from a manhole in the Recharge Basin Area. The existing monitoring well network provides upgradient and downgradient locations for the eastern portion of the facility and downgradient locations for the western portion of the facility, but lacks upgradient locations for the western portion of the facility. Therefore, if contamination is detected in the western portion of the facility, the investigation may not be able to conclude whether it originated on the former NWIRP Bethpage property. Also included in the investigation is collection of water samples from the manhole near the northeast recharge basin. A continuous flow of water from Bethpage Community Park enters the manhole from the east. In addition, water from the Northrop Grumman North Campus has been observed to enter the manhole from the north. A sample will be collected from each source.

Proposed sampling locations are presented on Figure 2. The well and sample location details, nomenclature, and analyses are summarized on Table 1. Table 2 presents the project specific analyte list. The samples will be analyzed for VOCs via analytical method SW846 8260C and 1,4-dioxane via analytical method SW846 8270D SIM.

Groundwater Sampling

Groundwater samples will be collected from all the usable monitoring wells within the existing on-property network (Figure 2). Monitoring wells will be investigated approximately two weeks before the sampling event, and if a well is determined to be damaged and cannot be readily repaired, it will not be sampled. In addition, for those monitoring wells that have not be sampled in the past 8 years (see Table 1), the well screen and casing will be purged approximately 2 weeks prior to the sampling event.

A down-hole, variable speed, submersible, centrifugal pump (e.g., Monsoon) with high-density polyethylene tubing will be used for groundwater purging and collection activities. The pump will be used in combination with a continuous flow-through cell suitable for taking water quality measurements (dissolved oxygen, oxidation-reduction potential, specific conductance, pH, temperature, and turbidity). Turbidity measurements will be made using a separate field turbidity meter specifically designated to measure turbidity only. Depending on stabilization of the groundwater parameters, two to five screen volumes will be purged prior to sample collection. The groundwater monitoring wells will be analyzed as indicated on Table 1.

Surface Water Sampling

Surface water will be collected from the manhole near the northeast recharge basin (Figure 2). Samples will be collected from the influent line prior to the water blending with other sources in the manhole. One sample will be collected from Bethpage Community Park influent water and one sample will be collected from the Northop Grumman North Campus influent water, if flow is observed. If active flow from another source is identified in the manhole, it will also be sampled. Samples will be collected with a stainless steel bailer and will be analyzed as indicated on Table 1. Water quality parameters (dissolved oxygen, oxidation-reduction potential, specific conductance,

pH, temperature, and turbidity) will be collected directly from the bailer at the time of sample collection.

Quality Control Samples

Quality assurance and quality control samples will be collected for groundwater and surface water samples. Duplicate samples will be collected at 10 percent (1 per 10 samples). Matrix spike and matrix spike duplicate (MS/MSD) samples (i.e., triple volume) will be collected at a rate of 5 percent (1 per 20 samples). MS/MSDs will receive the same sample ID as the respective parent samples, and the triple volume will be noted in the field log book and on chain-of-custody form. An equipment blank will be collected once per week that samples are collected with reusable equipment.

Equipment Decontamination

Reusable sampling equipment decontamination will consist of washing using a non-phosphate detergent followed by a rinse with deionized water provided by the laboratory.

Waste Management

Aqueous investigative-derived waste (IDW) will be generated during well sampling activities. The aqueous IDW will be containerized pending waste characterization analysis. IDW will be characterized for VOCs, semivolatile organic compounds, pesticides, Target Analyte List Metals, and reactivity. Based on the results of the waste characterization, the waste will be discharged via the local industrial wastewater discharge permit or transported offsite and appropriately disposed by the IDW subcontractor.

Reporting

The data collected will be evaluated and submitted in a Preliminary Assessment/Site Inspection Report. The evaluation will be based on direct comparison to New York State Maximum Contaminant Levels and United States Environmental Protection Agency Regional Screening Levels. Pending review of analytical results and consultation with New York State Department of Environmental Conservation, a determination will be made whether additional sampling is to be conducted. Recommendations will be made on whether to proceed with additional action (e.g. another more refined round of sampling), a remedial investigation, risk assessment, or a no action decision.

REFERENECS

Arcadis, 2003. Public Water Supply Contingency Plan, NWIRP Bethpage, Bethpage New York. Melville, New York.

Navy, 1995. Record of Decision, NWIRP Bethpage, Sites 1,2,3. Bethpage, New York. May.

Navy, 2003. Record of Decision, Operable Unit 2- Groundwater, Revision 1, NWIRP Bethpage. Bethpage, New York. April.

TABLES

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Table 1: Sample Details
2018 VOC and 1,4-Dioxane Investigation
Facility Wide NWIRP Bethpage
Bethpage, New York

Sample ID Number/Nomenclature[1,2]	Matrix	Depth of Screened Interval (feet bgs)	Analysis [3]
Monitoring Well Locations			
BPHNMW08D-2018MMDD	Groundwater	188	VOCs /1,4-Dioxane
BPS1-TT-MW301D-2018MMDD	Groundwater	210-220	VOCs /1,4-Dioxane
BPS1-TT-MW301I-2018MMDD	Groundwater	130-140	VOCs /1,4-Dioxane
BPS1-TT-MW301S-2018MMDD	Groundwater	51-61	VOCs /1,4-Dioxane
BPS1-TT-MW302D-2018MMDD	Groundwater	203-213	VOCs /1,4-Dioxane
BPS1-TT-MW302I1-2018MMDD	Groundwater	110-120	VOCs /1,4-Dioxane
BPS1-TT-MW302I2-2018MMDD	Groundwater	140-150	VOCs /1,4-Dioxane
BPS1-TT-MW302S-2018MMDD	Groundwater	41-51	VOCs /1,4-Dioxane
BPS1-TT-MW303D-2018MMDD	Groundwater	208-218	VOCs /1,4-Dioxane
BPS1-TT-MW303I1-2018MMDD	Groundwater	95-105	VOCs /1,4-Dioxane
BPS1-TT-MW303I2-2018MMDD	Groundwater	146-156	VOCs /1,4-Dioxane
BPS1-TT-MW303S-2018MMDD	Groundwater	46-56	VOCs /1,4-Dioxane
BPS1-TT-MW304D-2018MMDD	Groundwater	180-190	VOCs /1,4-Dioxane
BPS1-TT-MW304I1-2018MMDD	Groundwater	102-112	VOCs /1,4-Dioxane
BPS1-TT-MW304I2-2018MMDD	Groundwater	140-150	VOCs /1,4-Dioxane
BPS1-TT-MW304S-2018MMDD	Groundwater	43-53	VOCs /1,4-Dioxane
BPS1-TT-MW305D-2018MMDD	Groundwater	286-296	VOCs /1,4-Dioxane
BPS1-TT-MW305I-2018MMDD	Groundwater	190-200	VOCs /1,4-Dioxane
BPS1-TT-MW305S-2018MMDD	Groundwater	40-50	VOCs /1,4-Dioxane
BPS1-TT-MW306D-2018MMDD	Groundwater	284-294	VOCs /1,4-Dioxane
BPS1-TT-MW306I-2018MMDD	Groundwater	189-199	VOCs /1,4-Dioxane
BPS1-TT-MW306S-2018MMDD	Groundwater	50-60	VOCs /1,4-Dioxane
BPS1-TT-MW307D-2018MMDD	Groundwater	276-286	VOCs /1,4-Dioxane
BPS1-TT-MW307I-2018MMDD	Groundwater	188-198	VOCs /1,4-Dioxane
BPS1-TT-MW307S-2018MMDD	Groundwater	40.5-50.5	VOCs /1,4-Dioxane
BPS1-TT-MW308D-2018MMDD	Groundwater	250-260	VOCs /1,4-Dioxane
BPS1-TT-MW308I-2018MMDD	Groundwater	156-166	VOCs /1,4-Dioxane
BPS1-TT-MW308-2018MMDD	Groundwater	54-64	VOCs /1,4-Dioxane
BPS1-TT-MW309D-2018MMDD	Groundwater	252-262	VOCs /1,4-Dioxane
BPS1-TT-MW309I-2018MMDD	Groundwater	160-170	VOCs /1,4-Dioxane
BPS1-TT-MW309S-2018MMDD	Groundwater	53-63	VOCs /1,4-Dioxane
BPS1-TT-MW310S-2018MMDD	Groundwater	57.5-67.5	VOCs /1,4-Dioxane
BPS1-TT-MW311I-2018MMDD	Groundwater	160-170	VOCs /1,4-Dioxane
BPS1-TT-MW311S-2018MMDD	Groundwater	55-65	VOCs /1,4-Dioxane
BPS1-TT-MW312I-2018MMDD	Groundwater	160-170	VOCs /1,4-Dioxane
BPS1-TT-MW312S-2018MMDD	Groundwater	53-63	VOCs /1,4-Dioxane
BPS1-TT-MW313S-2018MMDD	Groundwater	53-63	VOCs /1,4-Dioxane
BPS1-TT-MW314I-2018MMDD	Groundwater	144-154	VOCs /1,4-Dioxane
BPS1-TT-MW314S-2018MMDD	Groundwater	55-65	VOCs /1,4-Dioxane
BPS1FWM 03-2018MMDD	Groundwater	52-67	VOCs /1,4-Dioxane

Table 1: Sample Details
2018 VOC and 1,4-Dioxane Investigation
Facility Wide NWIRP Bethpage
Bethpage, New York

Sample ID Number/Nomenclature[1,2]	Matrix	Depth of Screened Interval (feet bgs)	Analysis [3]
FW-01-2018MMDD	Groundwater	48.5-63.5	VOCs /1,4-Dioxane
FW-02-2018MMDD	Groundwater	52-67	VOCs /1,4-Dioxane
HN-24IR-2018MMDD	Groundwater	148-158	VOCs /1,4-Dioxane
HN-24S-2018MMDD	Groundwater	48.6-58.6	VOCs /1,4-Dioxane
HN-29D-2018MMDD	Groundwater	210-220	VOCs /1,4-Dioxane
HN-29IR-2018MMDD	Groundwater	120-130	VOCs /1,4-Dioxane
BPTTAOC-22-MW01-2018MMDD	Groundwater	48-68	VOCs /1,4-Dioxane
BPTTAOC-22-MW02-2018MMDD	Groundwater	46-66	VOCs /1,4-Dioxane
BPTTAOC-22-MW03-2018MMDD	Groundwater	45.5-65.5	VOCs /1,4-Dioxane
BPTTAOC-22-MW04-2018MMDD	Groundwater	46-66	VOCs /1,4-Dioxane
BPTTAOC-22-MW05-2018MMDD	Groundwater	47-67	VOCs /1,4-Dioxane
BPTTAOC-22-MW06-2018MMDD	Groundwater	52-62	VOCs /1,4-Dioxane
BPTTAOC-22-MW07-2018MMDD	Groundwater	52-62	VOCs /1,4-Dioxane
BPTTAOC-22-MW08-2018MMDD	Groundwater	52-62	VOCs /1,4-Dioxane
BPTTAOC-22-MW09-2018MMDD	Groundwater	52-62	VOCs /1,4-Dioxane
BPTTAOC-22-MW10-2018MMDD	Groundwater	49-59	VOCs /1,4-Dioxane
Surface Water			
BP-MH-SW4001-XXXX-2018MMDD	Surface Water	NA	VOCs /1,4-Dioxane
BP-MH-SW4001-XXXX-2018MMDD	Surface Water	NA	VOCs/1,4-Dioxane

Notes:
Shaded rows indicate wells that were installed prior to 2010. Wells that were installed prior to 2010, and that have not been sampled since 2010 will be subjected to an extended well screen and casing purge approximately two weeks prior to sampling.

1 MMDD is the two digit month and two digit day that the sample is collected. As an example, if BPTT-MW313S is sampled on April 10, 2018, the sample nomenclature would be BPTT-MW313S-20180410.

XXXX is the direction from which the influent is flowing into the manhole. As an example, if the sample is collected on April 10, 2018 from a source entering the manhole from the north, the sample nomenclature would be BP-MH-SW4001-NORTH-20180410.

2 Locations where field duplicates will be collected will be determined in the field by the Tetra Tech FOL.

3 Water quality parameters consisting of dissolved oxygen, oxidation reduction potential, specific conductance, pH, temperature, and turbidity will be collected at each sample location.

Table 2: Analyte List
2018 On-property VOC and 1,4-dioxane Investigation
Facility-Wide, NWIRP Bethpage
Bethpage, New York
1 of 2

Analyte	CAS Number
VOCs (microgram per liter)	
Acetone	67-64-1
Acrolein	107-02-8
Acrylonitrile	107-13-1
Benzene	71-43-2
Bromobenzene	108-86-1
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform	75-25-2
Bromomethane	74-83-9
n-Butylbenzene	104-51-8
sec-Butylbenzene	135-98-8
tert-Butylbenzene	98-06-6
2-Butanone	78-93-3
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chlorodibromomethane	124-48-1
Chloroethane	75-00-3
Chloroform	67-66-3
Chloromethane	74-87-3
2-Chlorotoluene	95-49-8
4-Chlorotoluene	106-43-4
Cyclohexane	110-82-7
1,2-Dibromo-3-Chloropropane (Dibromochloropropane)	96-12-8
1,2-Dibromoethane	106-93-4
Dibromomethane	74-95-3
1,2-Dichlorobenzene	95-50-1
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
Dibromochloromethane	124-48-1
trans-1,4-Dichloro-2-butene	110-57-6
Dichlorodifluoromethane	75-71-8
1,1-Dichloroethane	75-34-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethene	75-35-4
cis-1,2-Dichloroethene	156-59-2
trans-1,2-Dichloroethene	156-60-5
1,2-Dichloropropane	78-87-5
2,2-Dichloropropane	594-20-7
1,3-Dichloropropane	142-28-9
1,1-Dichloropropene	563-58-6
cis-1,3-Dichloropropene	10061-01-5

Table 2: Analyte List
2018 On-property VOC and 1,4-dioxane Investigation
Facility-Wide, NWIRP Bethpage
Bethpage, New York
2 of 2

Analyte	CAS Number
trans-1,3-Dichloropropene	10061-02-6
Ethylbenzene	100-41-4
Hexachloroethane	67-72-1
Hexachlorobutadiene	87-68-3
2-Hexanone	591-78-6
Isopropylbenzene	98-82-8
p-Isopropyltoluene	99-87-8
Methyl Acetate	79-20-9
Methyl tert-butyl ether	1634-04-4
Methylcyclohexane	108-87-2
Methylene chloride	75-09-2
Methyl iodide	74-88-4
Methyl methacrylate	80-62-6
4-Methyl-2-pentanone	108-10-1
Naphthalene	91-20-3
n-Propylbenzene	103-65-1
Styrene	100-42-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethene	127-18-4
Toluene	108-88-3
1,2,4-Trichlorobenzene	120-82-1
1,2,3-Trichlorobenzene	87-61-6
1,1,1-Trichloroethane	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethene	79-01-6
1,1,2-Trichloro-1,2,2-Trifluoroethan	76-13-1
Trichlorofluoromethane	75-69-4
1,2,3-Trichloropropane	96-18-4
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Vinyl chloride	75-01-4
o-Xylene	95-47-6
m+p-Xylenes	108-38-3 / 106-42-3
SVOCs (microgram per liter)	
1,4-dioxane	123-91-1

Notes:
Shaded cells indicate site specific analytes, per the PWSCP.

FIGURES

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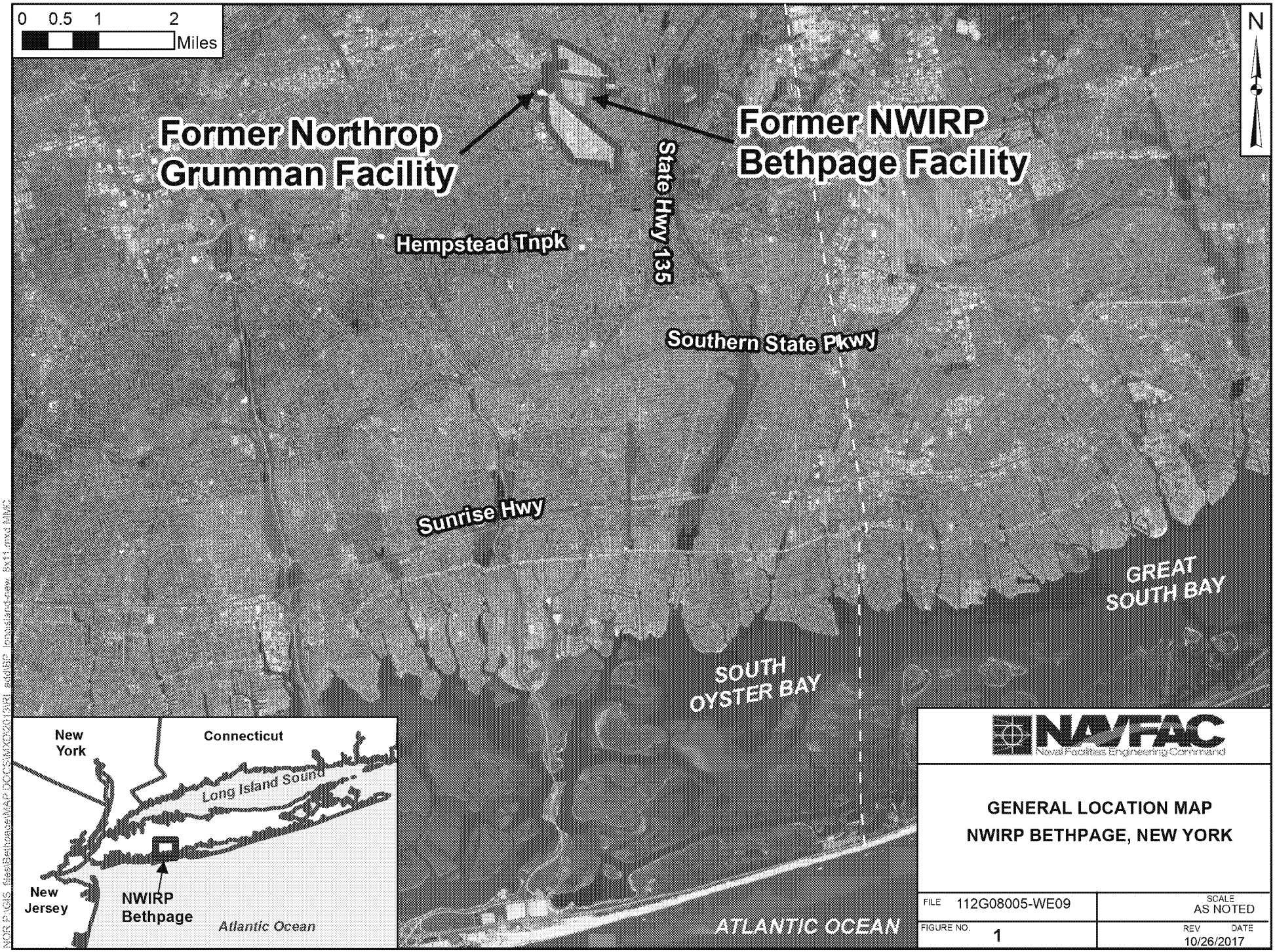

NAVFAC
Naval Facilities Engineering Command

GENERAL LOCATION MAP
NWIRP BETHPAGE, NEW YORK

FILE	112G08005-WE09	SCALE	AS NOTED
FIGURE NO.	1	REV DATE	10/26/2017

ED_002631A_00011459-00013


N
Plant 20
GROUNDWATER FLOW
AEROSPACE BOULEVARD
SOUTH OYSTER BAY ROAD
LONG ISLAND RAILROAD
Manhole
MW310S
MW311S
MW311I
MW312I
MW312S
MW309D
MW309I
MW309S
MH-SW-4001
MW313S
SLUDGE DRYING BEDS
NORTHEAST RECHARGE BASIN
OU3 Interim Remedial Measure Treatment System
Bethpage Community Park
MW308S
MW308I
MW308D
SOUTHWEST RECHARGE BASIN
SOUTHEAST RECHARGE BASIN
Site 3- Salvage Storage Area
Site 2- Recharge Basin Area
MW314S
MW314I
MW301D
MW301I
MW301S
HN-27I
Site 4- Former UST Area
Plant 3
Site 1- Former Drum Marshaling Area
AOC22-MW11
AOC22-MW05
AOC22-MW03
HN-24I
HN-24S
AOC22-MW02
HN-24IR
AOC22-MW09
FW-MW02
FW-MW03
FW-MW01
9 acre Navy Retained Parcel
AOC22-MW08
AOC22-MW10
HN-29IR
HN-29D
AOC22-MW07
AOC22-MW06
MW302I2
MW304S
MW302D
MW302S
MW303S
MW304I1
Plant 10
MW302I1
MW303D
MW303I2
MW304D
MW303I1
MW304I2
Plant 17
MW305I
MW305D
MW306S
MW306D
MW307I
MW307D
MW305S
MW307S
MW306I
NYGIS March 2018 Aerial Photo
Legend
Manhole
Proposed Monitoring Well for 2018 Sampling
Proposed Surface Water Sample location for 2018 sampling
Utility Drain Line
Site Boundary
9 Acre Parcel
1997 NWIRP Bethpage Property
1962 Northrop Grumman Property (Bethpage Community Park)
0
350
700
Feet
NAVFAC
Naval Facilities Engineering Command
SAMPLING LOCATIONS
NWIRP BETHPAGE, NEW YORK
FILE 112G08005-WE13
SCALE AS NOTED
FIGURE NO. 2
REV
DATE 3/9/2018